

## **ELECTRIC SHAVER**

### **BACKGROUND**

**[0001]** The present development is directed to a dry shaver utilizing a replaceable energy supply for a motor wherein the motor is relatively high speed and directly drives cutting blade reciprocations. The development is also directed to a switch assembly for the shaver providing a "Try Me" operating mode while the shaver is in a packaging, and a distinct "on-off" mode when removed from the packaging.

**[0002]** Dry shavers, as opposed to wet shavers (a blade requiring a lubricating foam), require an energy supply for a motor to drive a cutting blade assembly which effectively operates to shear hair in the shaving operation. An outer shearing foil is disposed to engage the skin of a user and includes apertures to allow shearable hair to pass through the foil for the cutting operation as a reciprocating blade moves against the foil. The reciprocating movement of the cutting blade is effected by a transmission assembly interposed between a drive motor and a cutting blade. As it is desired that the reciprocations occur with a frequency in the range of thousands of cycles per second, such transmission assemblies have been constructed with a design intent to withstand the cyclical frequencies over a relatively long period of time. Many users keep their electric shavers for periods of years. The robust assembly requirements for such shavers tend to promote design objectives employing complex gearing assemblies, rechargeable battery supplies and minimized reciprocating speeds for the cutting blade, all for promoting a long, maintenance-free life of the shaver. It should be particularly noted that higher speed reciprocations of the cutting blade assembly, although enhancing shearing efficiencies, can be expected to engender more vibration, friction and heat within the cutting blade assembly, thereby diminishing the design objectives of a longer life and robustness.

**[0003]** The complexities of prior known dry shaver systems have resulted in a commercial market for such shavers dominated by relatively high cost products, having increased weight and bulk necessary to accommodate rechargeable battery systems, complex curing assemblies and ubiquitous vibration damping componentry.

**[0004]** There is a need for a simplified, yet still robust, low cost dry shaver that can provide an effective shaver operation through efficient shearing, while avoiding complex drive and gearing transmission assemblies, heavy and expensive rechargeable battery supplies, all in a lightweight and highly portable assembly.

**[0005]** Conventional dry shavers, as relatively expensive items, are normally packaged in a secure package precluding any access to the shaver in the packaging until a buyer has actually purchased the particular shaver. Certainly, demonstration models can be made available, but the demonstration models are not usually the particular shaver purchased by the buyer.

**[0006]** As the present development concerns a relatively low cost shaver, the merchandising of the shaver can be greatly facilitated by its enhanced exposure, accessibility and operable demonstration by a prospective purchaser. Operation testing of a desired product within a blister pack for citing interest in a product and satisfying a prospective buyer's product curiosity is well known for a range of consumer-type goods. Demonstrability is usually identified to the consumer with a "Try Me" tag line on the product packaging encouraging the prospective purchaser to operate the product in a manner which demonstrates but does not weaken or damage the product itself, or its energy supply, and is sufficient to satisfy most questions about the operability of the product. Almost all blister pack configurations including the "Try Me" feature require relatively complex packaging configurations to preclude accidentally putting the product within the packaging into a permanent on operation, thereby eventually completely draining the battery supply. Protrusions or walls are disposed about a switch assembly to preclude the switch assembly from movement into the permanent operation while in the packaging. In addition, it is usually important that the blister pack wholly contain the product so that any "Try Me" type operation must be performed through a wall of a blister pack and, thus, there will be a necessary spacing between the product itself and the product being tested. The integrity of the containing packaging is particularly important when the contained product is health or food related.

**[0007]** There is a need for a dry shaver packaging assembly which allows a prospective buyer to have the advantage of a "Try Me" test mode prior to purchase, but can be accomplished without a complex blister pack arrangement especially designed for protecting undesired shaver operation.

**[0008]** The subject development satisfies the above-referenced needs and others to provide a low cost dry shaver that is highly efficient in its shearing, yet extremely portable and can be merchandised within a "Try Me" type packaging arrangement.

#### SUMMARY

**[0009]** A portable electric shaver comprises a cutting assembly driven by a drive assembly. The drive assembly includes a motor and an associated drive shaft for operating the cutting assembly at cutting reciprocations greater than eight thousand cycles per minute for high-speed cutting operation. A replaceable battery supply is disposed within the shaver and connected to the drive assembly as a sole supply of power to the drive for generating motor revolutions matching the cutting reciprocations. A cam assembly is interposed between the motor and cutting assembly for causing the cutting reciprocations wherein the cam assembly includes an eccentric pin relative to the drive shaft and a gear assembly directly translates motor revolutions to the cutting reciprocations without reducing or enhancing operating cutting speeds.

**[0010]** The cutting assembly includes a swing bridge supporting an inner cutter and a support post fixed to the swing bridge and the inner cutter. The support post is aligned with the drive shaft and includes an aperture disposed relative to the eccentric pin for providing cam engaging surfaces whereby the cutting reciprocations of the inner cutter equal in frequency the revolutions of the drive shaft.

**[0011]** In accordance with another aspect of the present development, the shaver includes a switch for selectively operating the shaver wherein the switch includes a "Try Me" position for demonstrative operation prior to purchase.

**[0012]** In accordance with yet another more limited aspect of the present development, the shaver includes a cap for the cutting assembly wherein the cap includes a selectively removable cleaning brush mounted therein for cleaning of the blades of the cutting assembly.

**[0013]** In accordance with another aspect of the present development, a portable electric shaver is disposed in a packaging for facilitating selective demonstrative operation of the shaver within the packaging. The shaver comprises a switch having a first operating position operable only with a continuous manual exertion by a

potential purchaser while the shaver is disposed in the packaging for demonstrative operation. A second operating position causes a cutting operation of the shaver without the continuous manual exertion for effecting an actual shaving operation for the user. The second operating position is inhibited from unintended operation by the packaging.

**[0014]** In accordance with a more limited aspect of the present development, the packaging includes an opening for a user to move the switch to the first operating position. A packaging wall is disposed adjacent the opening to inhibit the movement of the switch to the second operating position so long as the shaver remains in the packaging.

**[0015]** It is a particular object of the present development to provide a low cost high speed, extremely portable dry shaver powered by removable batteries, such as a pair of AA batteries. The shaver has a particular advantage of being packaged within a packaging assembly which allows selective demonstrative operation of the shaver within the packaging for improved ease and accuracy of understanding the shaver operation.

**[0016]** These and some other objects and advantageous of the development will become more apparent from the following description of the preferred embodiments.

**[0017]**

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** FIGURE 1 is a front perspective view of the subject dry shaver;

**[0019]** FIGURE 2 is an exploded assembly view, in perspective, of the shaver;

**[0020]** FIGURE 3 is a perspective view showing the shaver trimming blade in an open operable position;

**[0021]** FIGURE 4 is a partially assembled perspective view for particularly showing the cutting assembly received in a swing bridge and mounted within the shaver shell;

**[0022]** FIGURE 5 is a cross-sectional planar view showing the batteries, motor, cam assembly and cutting assembly as received in the shaver shell;

**[0023]** FIGURE 6 is a side elevational view demonstrating the cross-sectional view of FIGURE 5 as taken along line 5-5 of FIGURE 6;

**[0024]** FIGURE 7 is a partial cross-sectional view showing the trimmer positioning assembly and a partial view of the switch assembly;

**[0025]** FIGURE 8 is a partial cross-sectional view particularly illustrating the drive mechanism for the trimmer blade and cutting assembly;

**[0026]** FIGURE 9 is a diagrammatic view illustrating the switch assembly in selected switch positions;

**[0027]** FIGURE 10 is an exploded planar view of the cutting assembly in association with the cam assembly and drive motor;

**[0028]** FIGURE 11 is an exploded perspective view of the elements of FIGURE 10;

**[0029]** FIGURE 12 is a perspective view of an end cap of the shaver;

**[0030]** FIGURE 13 is an exploded view of a shaver cap particularly showing the cleaning brush removed from its mounting position in the cap;

**[0031]** FIGURE 14 is a perspective view of the shaver received in a packaging assembly; and

**[0032]** FIGURE 15 is a cross-sectional elevational view particularly showing accessibility of the switch assembly of the razor within the packaging assembly.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0033]** With reference to FIGURE 1, an elevated perspective view of the subject electric dry shaver **10** is shown to include a cutting assembly portion **12** and a handle portion **14**. The handle portion includes an elongated grip **16** conveniently sized for one-handed manipulation during operational use. The handle portion also includes switch assembly **18** for the selective on-and-off operation of the shaver.

**[0034]** The cutting assembly portion **12** preferably includes a screen **20** preferably comprising a metallic foil or the like, though other materials could be employed so long as they provide a relatively thin apertured engaging surface to provide close and accessible shearing of hair, such as a man's beard. A trimmer assembly **24** provides a selectively operational hair trimmer which is positionable between a closed position wherein the trimming blade is latched within the cutting assembly portion **12**, or may be released by trimmer release plate **26** to project perpendicularly from the cutting assembly portion **12** when in the intended operational position (FIGURE 3). It can be appreciated from FIGURE 1 that the

subject shaver presents an expanded cutting assembly portion which tapers to a narrowed handle configuration intended for a more ergonomic configuration for the convenience of a user.

**[0035]** The componentry of the dry shaver is illustrated in exploded assembly in FIGURE 2 for ease of illustration. The outer body of the shaver **10** is comprised of a clamshell configuration including a front shell **32** through which the switch assembly **18** is accessible to the user and a back shell **34** primarily comprising a back wall for the shaver. The shells **32, 34** are fastened together with conventional fastening devices **36**. Screen **20** is held within the shaver by a foil holder **38** through tabs **40** on which the screen **20** is hung to present an arcuate disposition generally conforming to the cutting blades **52** for providing an intimate shearing surface as will hereinafter be more fully described. The foil holder **38** and screen **20** attached thereto can be selectively attached and removed (for cleaning or replacement) to and from the shells **32, 34** with opposed lock tabs **42** disposed for sliding engagement over and past the spring loaded projection bosses **44**.

**[0036]** The inner components of the cutting assembly portion **12** comprise the inner cutter or cutting blades **52**, configured in a generally semi-circular outer periphery for close mating engagement of the screen **20**, a swing bridge **54** for generally supporting the cutting blades **52** and a motor **56** having a shaft on which is received a cam **58** which reciprocates the swing bridge **54** and thereby the cutting blades **52** for the desired reciprocating shearing action during operation of the shaver. Power to the motor is controlled by a switch assembly **18** which is actuated by a switch button pad **64** accessible through aperture **66** in the front shell **32**. The motor is secured in the shell **32** through a motor hold down plate attached to shell **32** with conventional fasteners as shown. Energy to the motor **56** is directed by the switch assembly **18** from batteries **74** serially connected through a wire connection **76** and held within the shell battery compartment by an end cap **78**. A selectively includable battery cover seal **80** can protect the batteries from water contact and consequent corrosion.

**[0037]** A high-speed motor is preferred, i.e., about eight to ten thousand revolutions per minute. When such a speed is translated to cutting assembly reciprocations, a high efficiency shearing operation is obtained.

**[0038]** Other components shown in FIGURE 2 comprise the foil cover guard **82** and the trimmer assembly **24**.

**[0039]** FIGURES 3 and 4 better illustrate the disposition of the trimmer assembly **24**. In FIGURE 3 the trimmer is released to an operable position wherein a moving blade **88** disposed adjacent to fixed blade **90** presents a shearing surface useful for trimming longer hairs. The moving blade **88** depends from a support post **92** received between two swing bridge prongs **96**. The prongs **96** are part of the bridge **54** and thus as bridge **54** reciprocates, the prongs **96** reciprocate and the post **92** and blade **88** correspondingly reciprocate. When this trimmer is closed, the post **92** rotates away from the prongs **96** to preclude movement of the moving blade **88**.

**[0040]** FIGURE 4 also illustrates a biasing spring **98** which will urge the trimmer assembly into the position of FIGURE 3 upon manual release of locking cam plate **26**.

**[0041]** FIGURE 4 illustrates that the cutting blades **52** are attached to a post pad **104** and can be selectively removed from the pad **104** for replacement or cleaning. The motor shaft is aligned relative to the swing bridge **54** with a positioning wall **106** and grommet **107** for accurately positioning the motor neck through which the motor shaft extends in the appropriate position. Contact pads **110** serially communicate energy from the batteries through the switch assembly **18** to the motor **56**.

**[0042]** With reference to FIGURES 5 and 6, the cross-sectional view of FIGURE 5 more clearly illustrates the cooperating alignment between the motor **56**, swing bridge **54** and cutting blades **52**. More particularly, post **92** is received in swing bridge aperture **110** along the same line as cam pin **112** is received in swing cam aperture **114**. As the cam pin rotates around and in correspondence with the motor shaft, the pin **112** will only engage two of the side walls of aperture **114** because aperture **114** is sized to be elongated in the direction generally perpendicular to the width of the swing bridge shown in FIGURE 5. In other words, the swing bridge **54** will only reciprocate along the line generally parallel to the length of the cutting blades **52** so that the cutting blades will reciprocate against the screen **20** in one direction only. Swing bridge **54** swings within the cutting assembly portion **12** from flexible swing bridge legs **118**, **120**. The blade carrier **104** is biased by spring **124** so that the cutting blades **52** are constantly urged against the screen **20**.

**[0043]** With particular reference to FIGURES 7 and 8, the trimmer release spring **98** urges the trimmer to the open position shown in FIGURE 3. It is held in the closed position shown in FIGURE 6 by release plate **26** which locks the trimmer in the closed position and holds it in position due to the urging of locking spring **126**. FIGURE 8 also clearly shows that the intercomponentry of the cutting assembly comprising a swing bridge **54** is sealed against cut hair or other debris by elastomeric seal **128**.

**[0044]** FIGURES 10 and 11 comprise exploded views of the cutting assembly **12** and motor **56**. It can be seen that the aperture **114** in the swing bridge is sized so that the cam pin **112** only engages side walls **130**, **132** to translate the revolving motion of the cam **112** into the reciprocating action of the swing bridge. In order to minimize vibrations, the cam **58** includes an equal and opposite offset weight within the cam to balance against eccentric pin **112**. Preferably, the offset comprises a variable density construction of the cam, as opposed to an additional component to balance out the pin **112**. The cam assembly thus causes the same number of cutting reciprocations as motor revolutions and directly translates the motor revolutions to the cutting reciprocations without reducing or enhancing operating cutting speeds.

**[0045]** FIGURE 12 shows the end cap which can be selectively removed from the fastened front and back shell **32**, **34** for insertion replacement of the batteries. Cover guard **82** includes in its side wall a mount **136** for snap reception and holding of cleaning brush **138**. When the cap **82** is removed from the shaver **10** during use of the shaver, the brush can remain stored in the cap, or can be removed for cleaning of the screen **20** or cutting blades **52** after shaver use.

**[0046]** With particular reference to FIGURE 9, it is a feature of the shaver that is disposed in a packaging for facilitating selective demonstrative operation while remaining in the packaging. Switch assembly **18** comprises a leaf-spring type switch which closes an electric circuit between the batteries **10** and the motor in either of two positions. In switch arrangement **146** the switch spring **150** is spaced from the contacts **152**, **154** to present an open circuit, i.e., the "normal off" switch disposition. In arrangement **156**, switch **144** has been pushed so that the spring **150** is snapped closed to present a closed circuit with contact **154**. In this position, there is no need for a user to continue to push switch pad **144** as the shaver will remain in



this normal on position during use. Switch configuration **158** illustrates user operation to turn the shaver off or demonstrate its operation while in the packaging. A continuous manual exertion by a potential purchaser of switch pad **142** results in the closing of the circuit for the "Try Me" operation. The pressing on switch **142** can also cause a snapping of the spring away from contact **154** and upon release of switch pad **142** by the user will cause the circuit to go into the normal off position of arrangement **146**.

**[0047]** With reference to FIGURES 14 and 15, the demonstrative operation of the shaver within the packaging **160** can be seen. Arrangement **158** can only be caused by a user while the shaver **10** remains in the packaging **160**. The continuous manual exertion by a user on pad **142** will cause the shaver to run while in the packaging. When the user releases switch pad **142**, the switch assembly will return to arrangement **146**, the normal off position. The packaging **160** protects against the shaver being turned into the normal on operating position **156** by a protective bubble **162** which safely spaces a user or contacting object from mistakenly being able to contact switch pad **144**. Preferably, packaging **160** comprises a clear blister-pack type configuration in which the shaver, including the switch pads **142** or **144** and the cutting assembly portion **12** are clearly invisible to the user.

**[0048]** While the present development has been described with reference to various embodiments, it is not to be limited to the details set forth above, for it is intended to cover such modifications or changes as can be made within the scope of the attached claims.